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(54) FABRIC WITH LIMITED ELASTICITY FOR WAISTBANDS

(57) A method of providing a linear zone of limited and concealed elasticity to a garment or a part therefor comprises the steps of:

(1) raising a strip of elastic fabric comprising an elastic component and a heat-shrinkable component to such a temperature for such a duration that the inherent heat-shrinkage is reduced to a predetermined value;

(2) adhering a heat-fusible adhesive layer to a surface of the strip at a temperature below both the treatment temperature of step (1) and the full melt temperature of the adhesive;

(3) superimposing the strip on the garment or part so that one set of threads thereof are oblique to the strip;

(4) heating and pressing the superimposed strip and garment or part together at a temperature greater than that in step (1) to firmly bond the strip, the bonding temperature giving a predetermined shrinkage on cooling and relaxing, thus compressing the fabric of the garment or part a predetermined amount leaving the fabric flat and unruched in the bonded area.

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IMPROVEMENTS IN FABRIC OR GARMENT TECHNOLOGY

This invention relates to fabric or garment technology and more especially to the elastication of regions of fabric, or of garments. The invention is particularly useful when used in the construction of waistbands for skirts or trousers, or like articles and for simplicity of description will be predominantly described in relation to this context.

It is commonplace, if skirts or trousers are bought without trial wear or special fitting, e.g. in a retail store branch, for them to be returned or exchanged for a garment of different waist size. Sometimes the purchaser does not accurately know, or is optimistic about, the correct size. Additionally, waist size can vary over short periods, e.g. by amounts of up to 2 inches (5 cm) per day, so that a garment which is accurately sized when purchased can nonetheless be uncomfortable for extended period of wear. Some people, moreover, have a basic size which lies between the standard sizes available, or are proportioned in such a way as to render it difficult to find clothes of a comfortable fit overall.

It has previously been proposed to provide elasticated wrist or ankle cuffs, and elasticated waistbands, for various adults and childrens garments. The elastication typically comprises a length of stretchable tape-like fabric material woven or knitted to enclose elongate bands or tapes of rubber. To fabricate a waistband, for example, the tape is stretched to a desired length within, or up to, the maximum elongation available and then fixed by stitching or heat-fusible adhesive to the fabric at the waistband. For best results the elasticated tape is such as will not be affected in its properties or basic unstressed length by these procedures, especially the heat of fusion, and will therefore pull the waistband back to a predetermined size. None the less, such a waistband, when it has contracted to this predetermined base length does so from an extent of elongation such that the fabric of the waistband corrugates or ruches transversely in a more or less regular fashion.

There are accordingly two disadvantages with such prior art waist elastications.

Firstly, to give enough force to provide a waist grip over a variety of sizes, the elasticated tape has considerable extension capability. There is accordingly

the facility for misuse, by using this elasticity not only to accommodate minor size fluctuations or minor requirements of sizing or proportion but also, by mistake or optimism, to accommodate large substantive size differences beyond the ability of the attached garment fabric panels to accept without distortion. The resultant appearance is not a good advertisement for the manufacturer's original product. Secondly, the externally visible ruching is not always acceptable for the waistband of tailored or formal garments, or for growing children, who associate it with the size variability requirements of infants clothes.

This invention sets out to overcome these disadvantages and is based on the realisation that the proportional size variation, in a waistband or the like, necessary to maximise comfort (i.e. to accommodate diurnal size variation, body proportionality differences and intermediate basic sizing) and optimise appearance, as distinct from that necessary to accommodate substantive size differences, is small enough to be obtained by a different, non-ruching mode of size change on the fabric.

The invention is therefore based on suitable selection of materials and operation conditions to bring about in a reproducible fashion this relatively small

extensibility and contractability as needed for comfort adjustment, without risk of over-extension or externally visible ruching.

In one aspect the invention consists in a method of providing a linear zone of limited and concealed elasticity to a garment or a part therefor comprising the steps of:

(1) raising the temperature of a strip of elastic fabric comprising an elastic component and a heat-shrinkable component to such a temperature for such a duration that the inherent heat-shrinkage is reduced to a predetermined value;

(2) causing a heat-fusible adhesive layer to adhere to a surface of the strip at a temperature below the treatment temperature of step (1) and below the full melt temperature of the adhesive;

(3) superimposing the strip on the garment or part so orientated that one set of threads thereof are oblique to the strip;

(4) heating and pressing the superimposed strip and garment or part together at a temperature greater than that in step (1) to cause the strip to be firmly bonded

to the garment or part, the bonding temperature being selected to give a predetermined shrinkage on cooling and relaxing;

(5) allowing the assembly to cool and relax and the strip to shrink thus compressing the fabric of the garment or part to a predetermined amount leaving the fabric flat and unruched in the bonded area.

It is primarily envisaged that this zone of elasticity will be included in a waistband for a skirt or trousers, where the extent of available extension and retraction is adequate to provided comfortable wear without danger of abuse by overstretching and where the absence of ruching or corrugation gives a significant improvement in "tailored" appearance.

Thus the inextensible fabric may comprise a separate band of fabric, but is more often to be embodied as the upper edge region or margin of a garment panel. If necessary, this panel can be cut, and adhered to the strip, slightly on the bias to maintain the fit of the garment whatever the stretch.

Usually the elongate strip is located between two layers of textile, one being the garment panel and the other a bias-cut backing layer or lining.

The strip may be formed generally as an elasticated waist band of a structure known per se with an extensible cover extending over and mutually locating threads of elastomeric material such as natural rubber. The strip may, for example, be warp-knitted to accommodate the elasticity, and the extensible cover comprises a heat-shrinkable polymer yarn, preferably a polyester yarn. In accordance with the present invention the temperatures used in the method will depend on a number of factors including the nature of the garment fabric, the melt temperature of the adhesive and the shrinkage temperature of the heat shrinkable component. Typically, a garment fabric which is loosely woven or knitted and has a relatively high degree of potential compressibility can be provided with an elasticated strip capable of a greater degree of heat shrinkage than a fabric which is tightly woven with only a limited degree of compressibility. Thus, differently pre-treated elasticated strips will be suitable for different uses. Alternatively, and preferably, a standard pre-treated strip is used and the temperature, pressure and dwell-time of the application to the garment are varied to provide the required degree of shrinkage.

The temperature at which the adhesive layer is caused to adhere to the strip will be designed to be

lower than the temperature of step (1) and, since the adhesive must still be usable in step (4), the temperature must also be below the full melt temperature. In general, the temperature is sufficient to cause the adhesive to be tacky so as to provide a light adhesion to the strip.

The adhesive is a heat-fusible polymeric adhesive of the type commonly used in the garment industry, generally provided in the form of a light web or mesh. The material is designed to be fixed in place at a low temperature at which it becomes tacky, and then firmly bonded in place at a higher temperature at which the adhesive material softens. A wide range of this type of adhesive is provided, for example, by Freudenberg Non-Wovens Limited.

It is found that when the adhesive layer is applied to the elasticated strip, the inherent shrinkability is slightly decreased, presumably because of the increased stiffness of the fabric. Thus treatment in step (1) to control the inherent shrinkage to about 10% leads, after the attachment of the adhesive layer in step (2), to an inherent shrinkage of about 7 to 8%.

It should be mentioned that reference to temperatures in describing the method generally means the applied temperature, i.e. the temperature of the ironing press. Obviously, the degree of shrinkage of the heat shrinkable component, e.g. the polyester yarn, is actually dependent on the internal temperature reached in the yarn itself. Thus, a temperature of, say, 115°C, could be achieved by a press set at 115°C with a dwell time of several seconds, or a higher temperature but with a very brief dwell time.

In general, the method as defined above is carried out with the elasticated strip in a relaxed state. If, for example, a high degree of compression of the garment fabric were required, it would be possible, but more difficult, to carry out steps (3) and (4) with the strip slightly stretched so as to provide an extra degree of shortening of the bonded area.

The orientation of the strip in step (3) can generally be at any suitable angle greater than zero and less than 180°. Generally, the strip is placed roughly at right angles to one set of threads, e.g. the warp threads, so that the shrinkage in step (5) brings those threads

closer together. Obviously, if the angle is less than or more than 90°, the degree of compression will be less, although placing the garment fabric on the bias may be desirable for other conventional reasons.

Thus, there is also provided according the invention, as a vendible article, an elasticated band of the type described, impregnated and/or coated with fusible synthetic polymer adhesive such as polyvinylchloride, and subjected to a prior heat [and pressure] stabilisation, e.g. at 100-120°C, so as to possess accurately known and reproducible shrinkage characteristics at fusion temperatures for the adhesive i.e. preferably within the range 6-12% by an accuracy of 1% of original length.

The invention will be further described with reference to the accompanying drawings, in which:

Example 1

The operation of the this embodiment is dependent upon using a strip of selected elasticated tape e.g. Raschtex R3618 (Arthur Dagg Limited, Ireland). This is a well known material per se, and consists of a plurality of rubber warp strands, warp-knitted with a polyester yarn. The particular grade of elasticated strip utilized has the characteristic that, upon suitable heating, it contracts accurately to a

predetermined amount only leaving an inherent shrinkability of, for example, 8% or 10%.

The strip is thus treated under heat and pressure at a relatively low temperature of 115°, to provide an inherent shrinkage at higher temperatures of a predetermined amount, say 10%.

This strip is then provided, in the unstretched state, with a surface or impregnation loading of heat fusible adhesive in step (2), at a temperature of about 110°C..

This pre-treated tape is thereafter applied along another fabric tape or along the margin of a garment panel, and preferably overlaid at the back with some form of backing strip or tape, for example a fabric cut on the bias to accommodate expansion. The garment panel may be slightly bias cut to assist in its maintenance of the desired tailored appearance.

Uniting of this pre-treated tape with the margin and the backing is effected under pressure at, in this example, 160° or up to 180°C, whereby, for a predetermined time, e.g. 12 seconds, on cooling in step (5), the tape shrinks by an accurate predetermined amount (8% or 10% by way of example) so that the fibres of the outer strip or of the upper margin of the garment

panel are pulled inwards into closer relationship without however corrugating or ruching the fabric.

It will be apparent to a man skilled in the art that this tape stabilized by heat treatment at 115°C is itself a vendable article of commerce. Such tape can be wound into rolls, or otherwise presented, and sold as a product for use in the garment industry by the normal heat and pressure methods known per se.

Example 2

A variant of the embodiment of Example 1 involves some small amount of stretching of the tape, that is to say, by about 5% or some other small but accurately known amount. Thus, the tape is applied to the garment or to a waist band strip in step (3) as described above in a slightly stretched state, e.g. about 5%, and treated at 180°C under pressure. The amount by which it contracts, firstly to its neutral position, and secondly thereafter in step (5) by an accurately predetermined amount, is known in advance and can be related as before to the available take up of dimension by causing the fibres of the garment panel to arrive closer together without overlapping and ruching.

CLAIMS

1. A method of providing a linear zone of limited and concealed elasticity to a garment or a part therefor comprising the steps of:

(1) raising the temperature of a strip of elastic fabric comprising an elastic component and a heat-shrinkable component to such a temperature for such a duration that the inherent heat-shrinkage is reduced to a predetermined value;

(2) causing a heat-fusible adhesive layer to adhere to a surface of the strip at a temperature below the treatment temperature of step (1) and below the full melt temperature of the adhesive;

(3) superimposing the strip on the garment or part so orientated that one set of threads thereof are oblique to the strip;

(4) heating and pressing the superimposed strip and garment or part together at a temperature greater than that in step (1) to cause the strip to be firmly bonded to the garment or part, the bonding temperature being selected to give a predetermined shrinkage on cooling and relaxing;

(5) allowing the assembly to cool and relax and the strip to shrink thus compressing the fabric of the garment or part to a predetermined amount leaving the fabric flat and unruched in the bonded area.

2. A method as claimed in Claim 1, utilised to provide an elasticated waistband in a garment such as a skirt or pair of trousers.

3. A method as claimed in Claim 1 or 2, in which the temperature utilized to fuse the adhesive is from 116°C to 230°C and the pre-treatment temperature is 110-115°C.

4. A method as claimed in any of Claims 1 to 3, in which the heat shrinkable component comprises a polymer yarn.

5. A method as claimed in Claim 4, in which the yarn is a polyester yarn.

6. A method as claimed in Claim 5, in which the elastic strip comprises a knitted or woven fabric.

7. A garment having a linear zone of limited and concealed elasticity made by the method as claimed in any one of Claims 1 to 6.

8. A heat-shrinkable elasticated band of fabric comprising an elastic component and a heat-shrinkable component, the band having been pre-treated at a predetermined temperature and duration to cause the inherent heat shrinkage to be controlled to a predetermined value and then coated with a heat-fusible adhesive at a temperature below the said predetermined temperature and below the full melt temperature of the adhesive.

Patents Act 1977 **Examiner's report to the Comptroller under Section 17** **(The Search report)** 15	Application number GB 9523255.9
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Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE: WPI	Documents considered relevant following a search in respect of Claims :- 1-8

Categories of documents

X:	Document indicating lack of novelty or of inventive step.	P:	Document published on or after the declared priority date but before the filing date of the present application.
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Category	Identity of document and relevant passages	Relevant to claim(s)
A	GB 2256785 A (MARKS AND SPENCER)	1, 8

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